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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/388,265	09/01/1999	JIN-KUO HO	82666-000100	3661

7590

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EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 10/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/388,265

Applicant(s)

HO ET AL.

Examiner

Hung K. Vu

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-- **Th MAILING DATE of this communication appears on th cover sheet with the correspondence address --**
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-15 is/are allowed.
- 6) ☒ Claim(s) 16-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 07/02/02 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/388,265 is acceptable and a CPA has been established. An action on the CPA follows.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 16, 18-20 and 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamazaki (PN 4,559,552, of record).

Yamazaki discloses, as shown in Figure 8, an ohmic contact (61) in a semiconductor device, which is formed on a semiconductor material (5), the ohmic contact comprising a layer of p-type semiconductor oxide (64) and a conductive layer (63). (Col. 10, lines 38-42 and Col. 13, lines 1-8)

Note that at Col. 13, lines 1-8, Yamazaki discloses semiconductor oxide (64) has the same material as that of the invention (tin oxide or SnO). It is inherent that the semiconductor oxide (64) is p-type.

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With regard to claim 18, Yamazaki discloses the p-type semiconductor oxide is SnO.

With regard to claim 19, Yamazaki discloses the layer of semiconductor oxide includes a single oxide layer.

With regard to claim 20, Yamazaki discloses the layer of semiconductor oxide includes a plurality of layers of oxides of the same conductivity type (upper portion 64 and lower portion 64).

With regard to claim 22, it is inherent that a solid solution layer is being formed as result of the semiconductor oxide.

With regard to claim 23, Yamazaki discloses the conductive layer includes a single metal layer (aluminum and silver).

With regard to claim 24, Yamazaki discloses the conductive layer includes a plurality of metal layers (upper 63 and lower 63).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 21, 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (PN 4,559,552, of record).

With regard to claim 21, Yamazaki discloses all of the claimed limitations except the layer of semiconductor oxide includes a mixture layer of various oxides. However, Yamazaki discloses at Col. 13, lines 5-8, that the layer of semiconductor oxide (64) consisting of tin oxide or principally of tin oxide. Yamazaki also discloses at Col. 8, lines 57-60, that the layer of semiconductor oxide (62) consisting principally of indium oxide that contains 1 to 10% of an antimony oxide. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the layer of semiconductor oxide Yamazaki having principally of tin oxide containing an antimony oxide in order to obtain good ohmic contact with the P-type non-single-crystal semiconductor layer.

With regard to claims 25 and 27, Yamazaki discloses all of the claimed limitations except the material of the conductive film. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the conductive film of Yamazaki having the materials as that claimed by Applicants, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

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4. Claims 17 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (PN 4,559,552, of record) in view of Nakamura et al. (PN 5,563,422, of record). Yamazaki discloses all of the claimed limitations except the material of the semiconductor is p-type $\text{Al}_x\text{Ga}_y\text{In}_z\text{N}$, and $0 < x, y, z < 1$, and $x + y + z = 1$, or p-type GaN. However, Nakamura et al. discloses an ohmic contact having semiconductor material is p-type $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ or p-type GaN. Note that $z = 1 - x - y$ and Figures 2-4 of Nakamura et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the semiconductor of Yamazaki having the material selecting from a p-type $\text{Al}_x\text{Ga}_y\text{In}_z\text{N}$ or p-type GaN, such as taught by Nakamura et al., in order to improve the performance of the light-emitted device.

Allowable Subject Matter

5. Claims 8-15 are allowed.

6. The following is an examiner's statement of reasons for allowance:

Applicant's claims 8-15 are allowable over the references of record because none of these references disclose or can be combined to yield the claimed invention such as the ohmic contact in a semiconductor device which is formed on a p-type semiconductor material, the ohmic contact comprising a layer of p-type semiconductor oxide and metal in a conduction of mixed morphology.

Response to Arguments

7. Applicant's arguments filed 07/02/02 have been fully considered but they are not persuasive.

It is argued, at pages 3 and 4 of the Remarks, that tin oxide of Yamazaki is n-type semiconductor oxide not p-type semiconductor oxide. This argument is not convincing because Yamazaki discloses semiconductor oxide (64) has the same material as that of the invention (tin oxide or SnO). It is inherent that the semiconductor oxide (64) is p-type.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

October 18, 2002

Hung Vu